HINGE DEVICE

FIELD OF THE INVENTION

The present invention relates generally to the field of a portable radiotelephone, and more particularly to a hinge device of coupling a button cover and a body of the radiotelephone.

BACKGROUND OF THE INVENTION

A plurality of buttons is equipped on the top surface of a portable radiotelephone. A button cover covering the buttons is prepared to prevent the buttons of the radiotelephone from being accidentally operated by the unintentional exertion of force. The button cover may rotate between a first position covering the buttons and a second position allowing a user to push one of the buttons, which is known in the art.

The button cover structure of the portable radiotelephone should be designed for a user to use conveniently. For this, a hinge device is provided to make the button cover move automatically toward either the first or second position.

Manufacturers have tried to reduce the volume, size and weight of the portable radiotelephone. The more the radiotelephone is miniaturized, the more it needs to be easily manufactured. Thus, it is desirable that the hinge coupling a body of the radiotelephone with the button cover is modulated and miniaturized. The modulated hinge device is required to have the structure for holding moving parts of the hinge, such as a cam member, a cam follower and a spring. For miniaturization, the size and the number of parts of the holding structure should be reduced.

The relative motion between the cam member and the cam follower of the hinge is required to be smoothly done. Additionally, when the cam follower slides along the cam surface, it should be guided stably.

SUMMARY OF THE INVENTION

Accordingly, it is an object of the present invention to provide a hinge device having a reduced size.

It is another object of the present invention to provide a hinge device allowing the smooth and accurate relative motion between a cam portion and a cam follower.

The above and other objects of the present invention are accomplished by providing a hinge comprising:

- a can having a partially closed end, an opened end and a protrusion which can be bended so as to at least partially close the opened end;
- a first member contained within the can and having an end protruding through the partially closed end of the can;
- a second member contained within the can;
- one of the first member and the second member having a cam portion, the cam portion including at least a peak and two valleys separated by the peak and slopes connecting the peak and the valleys;
- the other of the first member and the second member having a cam follower interacting with said cam portion; and
- an elastic member contained within the can and pushing the second member toward the first member.

In accordance with another aspect of the invention, there is provided a hinge comprising:

- a can having a partially closed end and an opened end;
- a first member contained within the can and having an end protruding through the partially closed end of the can;

- a second member contained within the can;
- one of the first member and the second member having a cam portion, the cam portion including at least a peak and two valleys separated by the peak and slopes connecting the peak and the valleys, the cam portion having a cam surface formed on one side of the cam portion so that the intersection of the cam surface and a plane including a rotating axis of the hinge is maintained to be substantially same along the cam surface;
- the other of the first member and the second member having a cam follower interacting with said cam portion;
- an elastic member contained within the can and pushing the second member toward the first member; and
- a closer at least partially closing the opened end of the can.

BRIEF DESCRIPTION OF THE DRAWINGS

The above and other objects, advantages and features of the present invention will be apparent from the following description of preferred embodiments taken in conjunction with the accompanying drawings, wherein:

FIG. **1** is a partially cutaway exploded, perspective view of a portable radiotelephone showing that a hinge is assembled with a main body of the radiotelephone and a button cover is disassembled;

FIG. **2** is a partially cutaway exploded, perspective view of a upper housing of the portable radiotelephone and the hinge;

FIG. **3** is a exploded view of the hinge in accordance with the present invention;

FIG. **4** is a sectional view taken along the line IV—IV of FIG. **3**;

FIG. **5** is a perspective view of another second member of the hinge in accordance with the present invention;

FIGS. **6**A, **6**B and **6**C are sectional views of the hinge showing the operation of the hinge of FIG. **3**;

FIG. **7** is a exploded, perspective view of a first and second member of another hinge in accordance with the present invention; and

FIG. **8** is a exploded, perspective view of a first and second member of an alternative hinge in accordance with the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to FIG. **1**, a portable radiotelephone **10** has a button cover **12** mounted on an upper housing **11** thereof. The radiotelephone **10** has a hinge **14** to couple the upper housing **11** and the button cover **12**. The hinge **14** has a rotatable shaft **16** extended outwardly. The shaft **16** has engaging surfaces **18**. The button cover **12** has a bushing **19** engaging with the shaft **16**. Alternatively, the button cover has a shaft, while the hinge has a bushing.

Referring to FIG. **2**, the hinge **14** is mounted into a cavity **22** of the upper housing **11**. A hole **23** for inserting the hinge **14** is prepared on a sidewall of the housing **11**. The hinge **14** is inserted through the hole **23**. Although FIG. **2** show that the hinge **14** is inserted through the hole **23**, the hinge **14** may be inserted from the above of the housing **11** shown in FIG. **2**.

Referring to FIG. **3**, the hinge **14** in accordance with an embodiment of the present invention has a can **24**, a first hinge member **26**, a second hinge member **28** and an elastic